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GENERAL FISHERIES COUNCIL FOR THE MEDITERRANEAN (GFCM)

REPORT OF THE SIXTEENTH SESSION

Rome, 27 September - 1 October 1982

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME 1983

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P-63
ISBN 92-5-101313-6

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For bibliographic purposes this document should be cited as follows:

General Fisheries Council for the Mediterranean (GFCM), Report of the sixteenth session. Rome, 27 September - 1 October 1982. 1983 GFCM Rep:, (16):45 p.

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DECISIONS, DIRECTIVES AND RECOMMENDATIONS OF THE SIXTEENTH SESSION OF GFCM

Fishery statistics

- Improvement of catch and effort statistics (paragraph 16)
- Collection of fishery expenditure and income data (paragraph 17)
- Improvement of knowledge on stock exploited in common (paragraphs 18, 42 and 75)

Resource assessment and management

- Endorsement of reports and recommendations of the technical consultations on resource assessment (paragraph 48)
- Consideration by future consultations of the problem of long-term abundance variations (paragraph 22)
- Organization of a workshop on methods of size structure analysis (paragraph 24)
- Organization of a technical consultation for the Black Sea (paragraph 31)
- Setting up of structures needed for resource assessment (paragraph 45)
- Possibility of establishing a Mediterranean Institute for Fishery Science (paragraph 46)

Artificial structures

- Need to follow their evolution (paragraphs 56 and 88)
- Need to set up administrative and legal frameworks (paragraphs 58 and 87)

Fisheries management

- Need to collect socio-economic data (paragraph 75)
- Organization of a meeting on resources exploited in common (paragraphs 79 and 150)
- Protection of red coral (paragraphs 93 and 149)

Fisheries technology

- Establishment of a Working Party on Fishing Technology and its Socio-Economic Aspects (paragraphs 99 and 148)

Utilization and marketing of small pelagic species

- Organization of workshops on fish utilization (paragraph 116)
- Need to work on utilization and marketing strategies (paragraph 119)

Regional project for the development and management of fisheries

- Action to be taken to start the project (paragraphs 134 and 136)

Regional project on aquaculture development

- Relations with COPRAQ (paragraphs 141 and 142)
- Implementation of the main phase of the project (paragraph 142)

FAO World Conference on Fisheries Management and Development

- Support of the Council to the Conference (paragraph 144)

Programme of meetings for the intersession

- Approval of a programme of meetings (paragraphs 148 and 150)

Selected bibliography on Mediterranean fisheries

- Continuation of this publication (paragraph 154)

IOC Programme of oceanographic studies

- Encouragement of GFCM to this programme (paragraph 156)

Election of Chairman and Vice-Chairmen

- Messrs M. Hadj Ali Salem, A. Bordes and L.Y. Yanev were elected Chairman, and first and second Vice-Chairmen, respectively (paragraph 160)

Date and place of the Seventeenth Session

- In two years time, at FAO Headquarters (paragraph 163)

I. INTRODUCTION

1. The Sixteenth Session of the General Fisheries Council for the Mediterranean (GFCM) was held at FAO Headquarters in Rome from 27 September to 1 October 1982, chaired by Mr. G. Bombace. Delegates from 12 of the 19 Member States, the Intergovernmental Oceanographic Commission, three representatives of the European Economic Community, and observers from Portugal and the International Juridical Organization took part in the discussions. Participants are listed in Appendix B.

2. In opening the session, the GFCM Chairman recalled that although Mediterranean fisheries production at 1.6 million tons in 1980 represents only 2 percent of the world figure, it does represent 5 percent of the total value due to the high average price of the species captured. He also indicated that countries in the region each year imported 2.4 million tons of fish on non-Mediterranean origin. Mediterranean production ought therefore to be increased to the limit, particularly by developing the consumption of small pelagic fish and the productivity of the coastal zone. The Chairman next recalled the conclusions and recommendations of the fifteenth session and indicated follow-up action on each. Several of these conclusions implied intensified economic and socio-economic studies on fisheries, and in the Chairman's opinion GFCM ought to set up a working party to examine these questions in close collaboration with the Working Party on Resource Appraisal and Fishery Statistics. Moreover, the latter was to be convened anew, particularly so that experts from the sub-regional consultations might get an overview of the management picture in the Mediterranean and go deeper into the related scientific questions. The Chairman also emphasized the fact that the Council should give close attention to individual country implementations of the recommendations adopted, analysing constraints where such appeared. Lastly, he stressed the need to coordinate GFCM efforts and action with those of the European Economic Community, particularly in terms of funding research and regulating fisheries activities in the Mediterranean.

3. Mr. A. Labon, Officer-in-Charge, FAO Fisheries Department, welcomed participants on behalf of the Director-General of FAO. He expressed satisfaction with this opportunity to address administrators and fisheries scientists in a region where several actions leading to fisheries development and management had first been developed with success before being applied to other marine areas - often for the benefit of developing countries. In this regard, follow-up on the Symposium on Management of Living Resources in the Mediterranean Coastal Area sould be very useful for other coastal areas comparable in situation to the Mediterranean. Mr. Labon commented that the Council was increasingly concerned with resource management. Having set a minimum mesh size for trawl fisheries, it was now attempting to propose measures to limit the fisheries effort. At the same time it was seeking to develop the utilization of small pelagic fish, thus helping to shift the fishing effort onto less exploited species and also to increase food resources for people. Indeed, he stressed, it had been a constant policy of the Director-General of FAO to promote all possible action, in all activity sectors of the Organization, leading to the increase and management of food resources intended for people. In connection with this, Mr. Labon drew the Council's attention to a World Conference on Fisheries Development and Management to be organized by FAO in 1984, during which problems specific to the Mediterranean will be discussed. In closing his speech, however, Mr. Labon expressed regret at the lukewarm reaction of most countries in the region to the unanimous recommendation of the fifteenth session of GFCM that a regional project be set up to develop and manage Mediterranean fisheries. He expressed the hope that discussions on this subject at this meeting would produce a solution to implement this recommendation of the Council.

4. The Council next adopted the agenda in Appendix A.

II. MONITORING AND ASSESSMENT OF RESOURCES

A. Fishery statistics

5. The Secretariat summarized statistical progress during the intersession (see documents GFCM/XVI/82/2 and 3) 1/. It indicated that form STATLANT 37 B was ready but that

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1/ The list of documents presented at the session is given in Appendix C

the planned printed list of target species was not yet complete. This limited list would be established on the basis of the longer list to be retained for form STATLANT 37 A.

6. It recalled that statistics now sent to FAO were not always broken down by type of fisheries (artisanal or industrial, pelagic or demersal).

7. The Council was informed of progress in drawing up the species lists (or list) to be printed on form STATLANT 37 A. The relevant lists for the western and central Mediterranean and the Adriatic were available and had been discussed during the relevant technical consultations. The lists on the Black Sea and the eastern Mediterranean had also been drawn up and submitted to users for comments. These lists would then be compared and the decision made to adopt one or more final lists.

8. The Secretariat stressed that the FAO vernacular names listed in the "FAO Species Identification Sheets for Fishery Purposes" had not yet been widely utilized, and that this was a constant source of error in data collection. Some countries, for instance Egypt and Greece, were still sending statistics very late - more than a year late. On the whole, however, definite progress had been made. Greece, Tunisia and Turkey were now breaking down their catches by GFCM statistical divisions, and Tunisia had also supplied statistics by type of fisheries (pelagic, trawl and coastal fisheries).

9. The Italian delegation reminded the meeting of the PESTAT programme (roughly costing 500 million lire) funded by the Ministry of the Merchant Marine and undertaken with the support of the "Istituto Ricerche Pesca Marittima", FAO (under contact), 12 coordinators and 45 young field enumerators. The frame survey for all Italy had been completed and the findings would be published in a few months. Data collection would then begin in all Italy in accordance with a scientifically determined sampling plan. When the PESTAT programme (a test programme) was over, it was hoped it might be made a permanent structure as provided by Law 41 approved by the Italian Parliament in February 1982.

10. The French delegation emphasized that the collection and dissemination of data on fisheries effort would raise certain problems in the case of coastal fisheries. The delegation reported to the Council on a research programme on which ISTPM[1] in Sète and the Languedoc-Roussillon region represented by CEPRALMAR (Centre d'études et de promotion des activités lagunaires et maritimes) had collaborated for management of the Languedoc-Roussillon coast. This programme could make a marked improvement in statistics on this kind of exploitation and is outlined in detail in paragraph 34. An effort was being made to collect statistics under this regional research programme. The French delegation also drew the attention of the Council to the fact that mollusc culture accounted for 40 percent in tonnage of the French Mediterranean production, and that better production statistics were needed.

11. The Algerian delegation recalled past constraints with conventional data collection systems and hoped to have more details on the Italian initiative and the PESTAT programme.

12. The Moroccan delegation informed the Council that progress had been made in the form of a new statistical unit, with a computer, set up at ISPM [2] in Casablanca. This new organization will provide a statistical breakdown by ports and fisheries but will only cover landings in ports. As for small-scale fisheries, a frame survey had been started in 1981. It would supposedly make possible a qualitative (perhaps quantitative) assessment of these fisheries. Biological sampling was now being done on sardine. An anchovy programme was also planned for 1983.

13. The Spanish delegation reported substantial progress since the last session, thanks to an in-depth programme on the Catalan fishery. A coastal fisheries monitoring programme had been undertaken in the Balearic Islands. The frame survey had been completed and data collection begun. Catch data by size structures were now available for hake, red mullet and sardine.

14. The STATLANT form was regularly utilized in Bulgaria. Captures had tripled in the last few years with improved utilization of small pelagic species, particularly sprat.

15. It was acknowledged that the paramount question of improving catch and effort statistics, particularly for coastal fisheries, should be a primary concern of the regional

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1/ Institut scientifique et technique des pêches maritimes
2/ Institut scientifique des pêches maritimes

project for the management and development of fisheries in the Mediterranean recommended by the fifteenth session of the Council, if it was established.

16. The Council recommended that this item also appear on the agenda of the next session of the Working Party on Resource Appraisal and Fishery Statistics

- Economic statistics

17. It was indicated that statistics breaking down expenditure and income should be collected for all types of fisheries in the interest of promoting better understanding about the real features and constraints of fisheries suitable for management. For Italy the PESTAT programme could be used to collect socio-economic data if the necessary financing could be found.

- Stocks exploited in common

18. The Council acknowledged the general need to improve, or begin, collecting biological and fishery statistical data, but recognized that particular attention had to be paid to stocks exploited in common by several countries. It therefore recommended that the countries involved do everything possible to improve presently available data so that joint management schemes could be worked out.

B. Assessment of resources

19. The Council noted the results of the various technical consultations on stock assessment which had met during the intersession.

(a) Assessment of resources in the Balearic and Gulf of Lions statistical divisions

20. Mr. J. Caddy presented the report of this Technical Consultation (see document GFCM/XVI/82/5) which was held in Casablanca from 7 to 11 December 1981. He recalled that the conventional approach to production models ran into the following problems: poor quality of statistics which are often improperly broken down, poorly defined fishing effort, uncertain definition of units of stocks. To obviate these difficulties, the Consultation chose an analytical approach based on the Y/R (yield/recruit) concept, rounded out by an original global approach making it possible to group data from different sectors (analysis of production trends per km² in function of fishing intensity, or effort per km²).

21. The Technical Consultation also considered the question of inter-annual yield fluctuations. These often periodic fluctuations were expected to lead to a revised concept of MSY. The work done in Mallorca showed the existence of major fluctuations over a 13-year period for hake and red mullet. Contrary fluctuations for anchovy and sardine off the Catalan and Balearic coasts had been noted. Several participants stated that the fluctuations did in fact seem to be very widespread. Mr. Bas reported to the Council that data in his possession on Micromesistius poutassou going back to 1942, showed an identical periodicity. Mr. Chaali indicated that apparent intra- and inter-annual compensatory phenomena had been observed in Morocco for the anchovy and sardine catch.

22. The Council acknowledged the importance of this aspect of production mechanisms and recommended that all due attention be paid to this question during the technical consultations. It stressed however that the necessary consideration of these fluctuations ought not to lead to a thoughtless rejection of data already available. The present state of most Mediterranean stocks called for setting up rational management as soon as possible and therefore all available tools, including production models, should be used, and the possible existence of long-term fluctuations taken into account in interpreting the data obtained.

23. The Council adopted the specific recommendations contained in the report of the Consultation concerning:

- the improvement of statistics (catch data by species, specific composition of demersal and pelagic catches, distinguishing between catches in the Moroccan and Spanish waters of the Alboran Sea, more detailed evaluation of the areas of the fishing grounds exploited);

- the utilization of methods of determination of dynamic parameters based on size structures;

- the regional promotion of research on age structures (otolimetry) and identity of stocks (electrophoresis);

- the promotion of joint acoustical surveys.

24. The Council asked the Secretariat to try to organize a workshop on methods of size structures analysis for determining dynamic parameters, a workshop recommended by the Casablanca Consultation.

(b) Assessment of resources in the Adriatic

25. Mr. C. Froglia presented the report of this Technical Consultation (see document GFCM/XVI/82/4) which met in Ancona from 18 to 22 May 1981. As in the western Mediterranean, an analytical approach based on the broadest possible spectrum of biological data was used in an attempt to offset the lack of fishery statistics. A catalogue of available statistics was now being prepared for this purpose, including synoptic charts, time series on hydrological data, catalogue of biological parameters and the like. Significant efforts had been made on both sides of the Adriatic to improve statistics. One recommendation of the Technical Consultation was to develop direct evaluation surveys using trawls, eggs and larvae, and acoustic investigations.

26. The attention of the Council was drawn to constraints to effective collaboration in research and management: the serious dearth of scientists actually delegated to work in applied fishery research, and administrative difficulties, particularly for acoustical research.

27. The specific problem of biological sampling of demersal fisheries was also taken up. There were considerable obstacles to this absolutely fundamental activity, and the tendency was to replace sampling-in-port by scientific research cruises which are highly expensive. A suggestion was made that specially trained professional sailors be used to take measurements on board trawlers. It was also recalled that the laboratories could cut costs by renting fishing boats for survey cruises. This did however raise the problem of standardizing findings from one survey to the next.

(c) Assessment of resources in the central Mediterranean

28. Mr. D. Levi presented the report of the first Technical Consultation held in this sub-region (see document GFCM/XVI/82/6). It was held in Tunis from 19 to 23 April 1982. The available data were compiled and a global analysis of demersal fisheries in the Strait of Sicily carried out. It indicated that resources were fully exploited. More detailed analyses had been made for some Tunisian demersal stocks. In most cases the findings had confirmed the global analysis. A detailed analysis of Italian fishery yields had led to the conclusion that, on the whole, stocks were very heavily fished in the northern part of the Strait and not so heavily fished in the southern part. There was still a considerable potential for small pelagic fish in the sub-region.

29. Mr. Levi emphasized the fact that the problem was one of optimum utilization of all resources of the Strait by countries bordering it, and added that such optimum use could only be obtained through effective collaboration on the part of the countries concerned. He recalled that Italy had proposed collaboration with Tunisia, such as putting scientists on board ships, training, and joint survey cruises. So far, there had been no response to these proposals.

30. The Tunisian delegation informed the Council that concrete results had been obtained with the establishment of a joint venture and that the remaining forms of collaboration,

particularly in research, ought also to develop rapidly as this was Tunisia's profound, often-expressed wish.

(d) Assessment of resources in the Black Sea

31. The Bulgarian delegation explained that a technical consultation was to have been held in autumn 1981 in Burgas. Romania had accepted the invitation but difficulties had arisen on the part of Turkey. Bulgaria stated it would always be happy to host this meeting which it considered basic for the rational management of migratory stocks such as turbot and asked the GFCM Secretariat to do everything possible to organize it.

(e) Age reading methodology

32. This meeting was held from 5 to 9 October 1981 in Montpellier. The results of the meeting were presented by Mr. D. Levi (see document GFCM/XVI/82/7). The Consultation considered the advantages and disadvantages of the various methodologies used for preparing, preserving and interpreting bony structures. It also considered the effect of bias or errors on age readings and on the findings of the evaluations. It made technical recommendations, some of which are already being applied in the laboratories involved. Lastly, the Consultation proposed that a second meeting be held in 1983 if a sufficient amount of new material had been collected.

(f) Evaluation of coastal resources

33. Participants were asked to present the results obtained with regard to Recommendation GFCM/XV/80/2 on the evaluation of present coastal resources, found in paragraph 8 of the report of the fifteenth session, particularly with regard to inventoring of lagoon sites, increase of the data collection efforts on coastal fisheries, and making a rough estimate of present coastal fisheries yields and the socio-economic role of coastal fisheries.

34. In France a research programme on coastal fisheries had been undertaken by ISTPM and CEPRALMAR working in collaboration on the coast of Languedoc-Roussillon. The programme had begun in March 1982, covered the 3-mile strip, and was zeroed in on identifying integrated management potential for this section of the coast. Initial stages would be listing craft and gear, getting in contact with the fishermen involved and proceeding to make some biological samplings. The initial approach would be global, and would examine seasonal fluctuations in catches, the extent of these fluctuations and gear selectivity. A climate of confidence was becoming established and fishing logbooks were being kept by some skippers. Though only very sketchy, available results already showed that the 3-mile strip was a conflict area in which small-scale, sport and trawl fisheries competed, often to the detriment of small-scale fisheries.

35. The question of the usefulness of logbooks for coastal fisheries was discussed. It appeared they were not very reliable where the fishermen have to pay taxes or duties proportionate to their catch.

36. Many studies had been made in Italy on coastal fisheries, especially in connection with special fisheries. Developments in the striped venus or "vongola" (Venus gallina) fishery were reported to the Council. This fishery had developed considerably since 1970 and resources had been overexploited in recent years. A quota of 2.5 tons/day and a minimum size at landing had been the rule since 1975, and a licensing system had been set up to curtail the fishing effort. But this measure had not sufficed to avert a major ulterior increase in real effort, particularly through an increase in engine power from 40 to 100 HP and more efficient dredges. Catches were poorly monitored. The 600 licensed fishing units had had logbooks since 1981. Data was collected on only 64 percent of these units. The recorded yield was 60 000 tons, but real tonnage was estimated at about 100 000 tons. There had also been an increase in land-based processing facilities (14 factories in 1974, 17 factories in 1982, some of which had doubled their processing capacity). Initially, the activities of various fishing units had been limited to specific zones. Unfortunately, exemptions had been granted, which reduced certain cooperative efforts to zero, creating considerable problems.

37. The Tunisian delegation brought up the specific problem of interaction between the coastal and trawl fisheries in the Gulf of Gabès. It indicated that shrimp trawling was authorized in the coastal area, under 50 m, because there was no other way of exploiting the species. However trials were nonetheless being conducted to promote the catch of shrimps by means other than trawling.

38. Lastly, it was stressed that open-sea marine cultures ought to have their place in the exploitation of the coastal area. In France, an important effort to implant mollusc culture in the coastal area had been made. However the most appropriate techniques for this new environment have not yet been found. In addition ISTPM had developed a method of evaluating mollusc biomasses in the traditional production centres. The turnover of these biomasses in the Mediterranean was not known but in the Atlantic it was 1/3 (100 t annual yield for 300 t biomass).

(g) Progress in fishery research

39. The second Technical Consultation on Stock Assessment in the Adriatic had recommended that the Council examine the question of matching available scientific resources in the Mediterranean with the management objectives (see paragraph 40 of the report of the Consultation).

40. The Secretariat presented a brief review of the results in this field of the technical consultations which had been held since 1979. It indicated that these meetings had identified a number of alarming problems. Lack of reliable statistics interfered with the use of global methods. Lack of biological data and insufficient numbers of samplings in port were a considerable constraint to the use of analytical methods. Political and/or bureaucratic stumbling blocks were sometimes holding back collaboration on surveys. Control of the fishing effort was not effective enough and the mesh size problem was still there and, in practice, still largely unresolved.

41. The consequences of the foregoing were the alarming realization that progress in acquiring data and evaluation was painfully slow considering the problems requiring solution (for example many stocks were now in a biological and economic state in which rational management at the earliest possible date was urgently needed).

42. In addition, the sub-regional technical consultations brought out the fact that, contrary to some accepted assumptions, there were quite a number of stocks exploited in common in the Mediterranean (in the Alboran Sea, in the Strait of Sicily, around the fringes of the Gulf of Lions, in the Black Sea, in the Adriatic, etc.) which in the present state of development of fisheries research (in the broad sense of the word) could not be rationally managed.

43. This was a situation calling for reflection on the part of the Council, concerning its own past action and present role, as of Member States, on progress achieved at the country level.

44. Several delegations reported on recent actions in their countries which might provide a long-term solution to these problems. In France, the new law on orientation and planning of research was expected to significantly improve the situation in particular through a major coordination effort at the national and regional levels. In addition ISTPM had recruited two economists, and their contribution was expected to be decisive. In the Balearic Islands, the rapidly developing acoustical survey sector had produced major results. In Tunisia a special effort involved surveying stocks of small pelagic species. In Algeria one very positive element had been the establishment of a State Secretariat for Fisheries and a Centre d'études, de recherche appliquée et de documentation pour la pêche et l'aquaculture (CERP). In Morocco, which was demonstrating a growing interest in its Mediterranean coast, the recent establishment of a Ministry of Fisheries and of the Merchant Marine, and the accordance of top priority to fisheries in the 1981-85 plan, offered the hopeful prospect of swift progress in the years to come. In Bulgaria two laboratories were sharing fishery research in the areas of biology (Varna) and fish and gear technology (Burgas). There was no problem with analysis or control of the fishing effort for purely national stocks or stocks limited to marine areas covered by the Mixed Commission for Black Sea Fisheries. Serious problems did arise however in the case of

stocks exploited in common with countries which were not members of the Commission. In Italy, problems were that research effort was scattered, that there was a lack of fishery research laboratories and that not enough posts had been created for the research workers. It was hoped that the planned new fishery research institute would lead to a solution of these problems. In conclusion, it seemed that in most of the GFCM countries changes were under way which in the long run should have a positive impact despite the fact that the technical consultations believed the present situation to be a matter for concern.

45. At the end of these discussions, the Council recommended that special attention be devoted to setting up now the structures and staff needed to evaluate and monitor resources, most particularly in Mediterranean areas exploited in common by several countries.

46. The Council also examined with interest the idea of establishing a Mediterranean Institute for Fishery Science. It was indicated that the question ought to be examined thoroughly. All possible action for promoting rational resource management and outlining a joint action programme ought to be pinpointed. If it appeared that the solution or partial solution to the problem might be to set up a training institute, then the Council ought to act on this. In this connection, it was indicated that in some countries training problems only arose for short training sessions.

47. In connection with future activities, the Council took note at this stage of the discussions of concerns expressed at the various meetings having taken place during the intersession about the need to go deeper into:

- methodologies of analysing size structures;

- age reading methodologies;

- management problems of stocks exploited in common.

48. Subject to further consideration of priorities concerning meetings during the intersession (see paragraphs 149 and 150), the Council expressed satisfaction with the work of the various technical consultations and endorsed their recommendations (see document GFCM/XVI/82/8, attached as Appendix D).

III. IMPROVEMENT OF NATURAL PRODUCTIVITY

A. Progress in the establishment of artificial reefs

49. This item on the agenda was presented by Mr. G. Bombace. He referred to Recommendation GFCM/XV/80/3 of the fifteenth session of GFCM "Development of the coastal area by artificial structures", which drew the attention of the competent authorities to the importance of promoting the development of these kinds of structures as part of their integrated coastal management plans. He indicated that the artificial reef established near Ancona in the Adriatic in 1975 had enabled progress to be made in the study of the scientific, technical, ecological, administrative, legal and economic problems of implementing such structures. But while much progress had been made, there were still scientific, legal and management problems, given the fact that though the new fisheries law , Law 41, provided for encouragement of and financing the establishment of artificial reefs, there was still no law in Italy on integrated coastline management.

50. The Council was informed that another Italian reef had been built in Fregene near the mouth of the river Tiber in the Spring of 1981. It was built of cement blocks measuring 8 m^3 and connected by cables, and covered a 6 ha area. One benefit was the possibility of comparing reef populations in two very different seas such as the Adriatic and the Tyrrhenian.

51. Other artificial reefs had been established in the Gulf of Genoa. Some, made up of automobile bodies sunk ten years ago had not produced good results. But reefs made up of wooden boat hulls, though attacked by xylophagous organisms, did provide an excellent base for attachments of organisms, made possible cephalopod spawns, and shelter for numerous fish. Cement pipes sunk to a depth of 15 metres also produced very good results. The Genoa experiments seemed to prove that one should not go deeper than 20 metres to get

substantial mussel production which under the best conditions (euthrophic, port, and lagoon areas in particular) could be as much as 100 kg/m²/year.

52. In Spain more progress had been made in the legal and legislative fields than in science. Indeed in May 1982 a royal decree had spelled out the legal aspects of establishing artificial structures and natural preserves. Planned reefs were now under way in Catalonia and the Balearic Islands.

53. The French delegation recalled the first trial at Palavas-les-Flots in 1968-69, which used automobile bodies which became covered with small oysters but disappeared long ago. A subsequent operation off Port-la-Nouvelle in 1980 sank 3 000 m³ of various materials (tyres, coment pipes, cement blocks) to a depth of 37 metres. This operation was financed by the State, the region, the department, the municipality and even some trawl fishermen's associations. It was planned to expand the reef to a volume of 12 000 m³. Reefs were also built off Beaulieu-sur-Mer and Golfe-Juan. These actions were rather empirical and local, but they helped to awaken the interest of public and other concerned organizations, creating a current favourable to integrated coastline management.

54. The presentation of the delegation of Monaco was illustrated by two brochures published by the "Association monégasque pour la protection de la nature" which were distributed to delegates: "Compte rendu des activités de l'Association 1980/1981" and "Développement des structures artificielles immergées" in the Monaco underwater preserve. The last paper, which was prepared for the session, described artificial structures of various types, and especially the three 10 tons reefs which were set up after the Palma de Mallorca Symposium, all constructed of non-polluting materials (concrete) which were laid in the Monaco underwater preserve over a 50 ha area, and the intensive colonization which followed these immersions.

55. In Israel, an experimental reef made up of masses of concrete and tyres was established in 1981 in Haifa. Follow-up to this experiment will be decided in accordance with the reports of scientists from the University of Haifa who are monitoring changes in the reef.

56. On conclusion of these presentations, some delegates noted that research ought to have the necessary means for scientific and technical follow-up of artificial structures. Such follow-up ought to produce the greatest possible information on the trends of these reefs, particularly on increases in the exploitable biomass.

57. It was mentioned that at ISTPM in Sète, an in depth bibliographic research concerning the scientific and technical aspects of artificial reefs had been undertaken. This activity is carried out within the framework of integrated management studies of the coastal area, supported by the region.

58. As Mr. Bombace had done in his introduction, several delegates also stressed the need for countries which had not yet done sot to set up administrative and legal fameworks detailing conditions for establishing, assigning and utilizing artificial structures and the resources they produce.

B. Aquaculture

59. Mr. M. Pedini, Technical Secretary of the Cooperative Programme of Research on Aquacultrue (COPRAQ) of the GFCM, reported on the developments since the celebration of the fourth session held in Barcelona, in October 1979. The lack of official offers to host the fifth session prevented holding it during the intersessional period, and there has been no way to evaluate the progresses achieved in the specific items for research recommended, namely the study of feeding requirements of cultivated species, larval feeds including local strains of Artemia salina, and diseases.

60. However, among the three main lines of recommendations adopted at the Barcelona meeting it was possible to establish a linkage with the Cooperative Programme of Research on Aquaculture (Fish Diseases) of the European Inland Fisheries Advisory Commission (EIFAC) which held its fourth session in Cadiz in October 1981, by including participation of research workers of the GFCM area and by adding a special point to the agenda in order to deal with fish diseases in mariculture.

61. The third main recommendation, to establish a close linkage with the then proposed Mediterranean Regional Aquaculture Project, has been pursued and it is only due to the delays experienced in the starting phase of this Project that a more active role has not been played. With the incoming Main Phase of MEDRAP, starting in 1983, it will be possible to activate mechanisms of promotion of research in which COPRAQ will participate (see paragraph 141).

62. The delegations gave a description of the last achievements and developments in the field of brackishwater and marine aquaculture in their respective countries. A report of the status of aquaculture in Italy had also been distributed, pointing out the shortage of wild fry in Italy as the major bottleneck for brackishwater aquaculture development. This is also causing a decrease in catches in the coastal lagoons, which are dropping to values of around 50 kg/ha/year. Some very encouraging results have been obtained by seeding the lagoons of Lesina and Grado with postlarvae of Penaeus japonicus produced in the hatchery of the National Council for Research (CNR) at Lesina.

63. In Spain the two institutes dealing with fisheries research are carrying out research in mariculture. The species dealt with by the Instituto de Investigaciones Pesqueras at Torrelasal are Artemia salina and the triple-grooved shrimp, sea bass, gilthead sea bream and sole. Studies on finfish centre around production of fry and reproductive physiology. The laboratory of the Instituto Español de Oceanografía at Mar Menor has similar programmes.

64. New experiments are carried out in the delta of the river Ebro to study the natural stocks and the effects of pesticides on them, and in the Balearic Islands on cage culture of Seriola dumerilii, the use of thermal effluents and the retrieval of natural beds of Venus verrucosa and experiemntal implantation of Ostrea edulis after having overcome a situation of intense pollution in the port of Mahon (Minorca).

65. As regards diseases, the Spanish delegation reported high mortalities of Spondylus gaederopus during the 1981 and 1982 summers. The same also happened in France and Italy. The causative agent is not yet known, but an Haplosporidian, Marteilia-like, is suspected.

66. The French delegation pointed out that a shortage of fry is also noticed in France in spite of the fact that six hatcheries were installed in the Mediterranean coast. Problems of nutrition and diseases are still encountered, and they are the subject of continuous in depth research. As regards molluscs, ISTPM has a project to create in 1983 at La Tremblade an experimental station on diseases and genetics.

67. In Israel a production of 1 500 tons of mullet is obtained using wild fry reared in freshwater ponds and investigations are going on on the possibility to produce Sparus aurata fry in hatcheries at economic conditions. Efforts will be continued as the low survival of the larvae make this proposition still not economically profitable.

68. Tunisia is now launching a mariculture programme mainly based on sea bass (fry production and fattening) and grey mullet (fattening). Furthermore, a national aquaculture centre will soon be built at Monastir. Finally other activities regarding gilthead seabream reproduction, grey mullet culture, and nutrition are also being started.

69. The Moroccan delegation reported on studies which had been carried out in the Nador lagoon where primary productivity had increased when a storm opened a pass through the coastline. It would be quite possible to develop aquaculture and the question was now being examined in collaboration with the MEDRAP project.

IV. FISHERIES MANAGEMENT

70. The report of the Fourth Session of the Committee on Resource Management (see document GFCM/XVI/82/9) was presented to the Council.

A. Limitation of mesh size

71. Concerning mesh size, the Secretariat recalled the three-point procedure which had been recommended at the Fifteenth Session (see paragraph 42 of its report): extension/information of fishermen; control of mesh size application without sanctions; strict enforcement. The following problems had arisen in applying Recommendation I/76/1 on mesh size:

- among the countries represented at the Fourth Session of the Committee on Resource Management, only France had undertaken the necessary selectivity studies;

- the budgetary and staff resources needed to develop information/extension campaigns were woefully inadequate at the research institute level;

- in Tunisia, where the 40 mm mesh size was widely enforced and controlled, stocks or portions of stocks exploited in common with other countries constituted a serious problem.

72. Those countries not represented at the Fourth Session of the Committee on Resource Management were requested to report to the Council on progress made. The delegation of Israel indicated that it was completely forbidden to import trawls with meshes smaller than 20 mm (bar of mesh).

73. Several delegations reaffirmed the positions taken at the meeting of the Committee on Resource Management. The Tunisian delegation explained that action on mesh size in Tunisia was considered one element in a determined policy to protect vital coastal areas (those where depths were less than 50 m). The fishermen concerned (from Sfax) had been fully and directly briefed on the problem and had received financial compensation.

74. The question of waiving seasonal trawling restrictions within the three-mile limit in winter in Italy was discussed. This was a specialized fishery for small-sized adult species of the Adriatic which can only be caught by a mesh size smaller than 40 mm. This fishery was controlled by a licensing system. A limited number of boats were involved and the fishing area of each boat was predetermined. Special mesh size studies were necessary for this fishery as a great many requests for waivers were expected starting in 1983 when the 40 mm mesh size limitation was to be strictly enforced in Italy.

B. Regulation of fishing effort

75. The report of the Technical Consultation on Regulation of Effort in Mediterranean Trawl Fisheries held in Rome in June 1982 (see document GFCM/XVI/82/10) was summarized by Mr. C. Bas who had chaired the meeting. He stated that a clear need existed for socio-economic information if the assessments made were to be effectively used. He stressed that the concern for over-fishing was real but it was necessary to determine how controls could be applied; most nations have agreed to freeze fleet size. Statistics were still considered inadequate for addressing this problem and improvements were required, particularly on regional collaboration on statistics for stocks exploited in common.

76. In response to the summary it was stated that determination of the optimum level of fishing effort was difficult. For certain resources a need existed to decrease the level of effort but socio-economic problems resulting from such a measure would be severe.

77. In France, even if the introduction of a trawling licensing system was useful in limiting the fishing effort, this system was not sufficient in itself and had to be completed by additional measures. Therefore a minimum mesh size of 20 mm (bar of mesh) and maximum 430 ch engine brake-horsepower are compulsory in the whole French Mediterranean. Local regulations regarding the duration of stays at sea have also been decided. Infringements to these regulations are legally penalized.

78. It was suggested that solutions to the problems of overfishing in the Mediterranean must be pragmatic and not be delayed with scientific concerns for the perfect solution. A need existed for implementing the Council's recommendations, such as mesh size, but one should go beyond in order to achieve progress.

79. Several delegations discussed the need for regulations on pelagic species, in particular those stocks exploited in common. It was suggested that the Council refer to this matter in its deliberations since it was responsible for providing a forum for cooperation. It was proposed that a meeting on pelagic resources exploited in common be organized (see paragraph 150) and well prepared in advance so that participants have the proper information to facilitate the discussion.

C. Management of coastal fisheries and other methods of exploiting coastal living resources

(a) Definition of a littoral management policy

80. It was observed that no GFCM member country represented at the session has yet devised an integrated littoral management strategy, despite the urgent need for doing so.

81. Important prerequisites for the definition of a national littoral management strategy are the development of a framework for revalorization of littoral resources and coordination among users, researchers, administrators and planners.

82. Observations from various Member States indicate that some progress is being made in achieving national littoral management strategies; however, this progress is more piecemeal than comprehensive in that, for example, legislation may deal only with class of users such as fisheries and mariculture.

83. Examples were given of how existing legislation may impede the development of mariculture to emphasize the need for coordination among users. Priority given to navigation freedom and security can seriously complicate the development of techniques and contributes to slacken the development of marine cultures in the open sea.

84. It was noted that management models already exist for the harmonious integration of different users of littoral resources where, for example, capture fisheries and aquaculture have used the same area for a long time without friction. It was suggested that these situations could be used to assist with littoral management strategy formulation in other areas.

85. In summary, during the intersessional period, progress has been made on the formulation of littoral management policies by some Member States. It was in general agreed that in many countries a point has been reached where the need for coordinating various management/development actions is clearly perceived.

(b) Development of the coastal area by artificial structures

86. A number of the various implications of Recommendation GFCM/XV/80/3 were dealt with in other sections of this report (see paragraphs 38 and 49 to 58).

87. Under this item emphasis was placed on one aspect of artificial structures, namely the need to provide a mechanism for allocating space for such installations when they become commercial and large-scale as opposed to the present situation where allocation for small-scale experimental installations is made by concession with input from the appropriate scientific and marine organizations. Spain has developed such a mechanism for the integration of artificial structures for coastal area development via royal decree (see paragraph 52).

88. Attention was drawn to the need for better communication among member countries of advances and research results on artificial structures (see paragraph 56).

(c) Progress report on "Management of coastal lagoon fisheries"

89. The purpose of this activity (see document GFCM/XVI/82/13) is to produce a manual on the management of coastal lagoon fisheries as recommended by the Council during its Fifteenth Session (see paragraph 2.3 a, page 42 of the Report of the Fifteenth Session).

90. This recommendation is being executed in two stages: the first stage includes the compilation of experience and review papers and the holding of a roundtable discussion to organize the material for inclusion in the manual. The second stage is the actual preparation of the manual. The timetable calls for the submission of experience and review papers by March 1983 and for the roundtable to be held in September 1983. The compiled papers and report of the roundtable will be published by GFCM. As of August 1982, 26 experience or review papers had been promised for the compilation and considerable interest had been expressed in the roundtable.

(d) Red coral resources and their management

91. The Spanish delegation brought this subject to the floor by observing that coral resources, due to their considerable commercial value, were being systematically over-exploited by destructive methods and that they cannot sustain present levels of exploitation.

92. It was pointed out that these resources have important biological functions and that their protection is of concern to the entire GFCM region. Destruction of coral is due not only to uncontrolled fleets, but also to domestic fishing practices. Some progress has been made in protecting coral by controlling the type of access, catch limitations and methods of exploitation. As a management principle it was suggested that non-destructive types of exploitation should be encouraged by providing certain incentives.

93. Further to these remarks, the Council adopted the following recommendation:

Upon the initiative of the Spanish delegation seconded by the delegations of Algeria, France, Morocco and Tunisia, and recognizing that red coral (Corallium rubrum) is a natural living resource of the Mediterranean region and therefore falls under the competence of GFCM,

Further recognizing that, although the over-exploitation of this species is yet lacking scientific confirmation, the red coral is, for want of management criteria, exploited intensively by destructive methods in certain countries,

Finally recognizing that in accordance with the decisions of the Third United Nations Conference on the Law of the Sea, coral, a sedentary species which is an integral part of the continental shelf for what regards its exploitation falls under the exclusive jurisdiction of the coastal states,

The Sixteenth Session of the General Fisheries Council for the Mediterranean recommends to the Member States of GFCM:

(i) that coral be considered a living resource which exploitation is to be rationally managed as that of all other living resources of the continental shelf,

(ii) that Member States give special attention to the dangers potentially endangering this species,

(iii) that the Secretariat, in close collaboration with the interested countries, endeavour to organize in 1983 a technical consultation open to all Member States concerned to:

(a) standardize the scientific criteria for evaluating and managing the resource,

(b) in accordance with these criteria plan an initial assessment of the coral resources of the Mediterranean region,

(c) make a critical analysis of present methods of exploitation,

(d) favour the exchange of experiences and existing legislative provisions on this matter among Member States.

V. FISHERIES DEVELOPMENT AND INCREASE OF THE VALUE OF CATCHES

A. Fisheries technology

94. The subject was introduced by Mr. M. Ben-Yami. He stressed that the technology cannot be dissociated from other factors, such as natural resources, economics, socio-cultural background, industrial and service infrastructure, etc., and that for this reason, the technical level of the Mediterranean fisheries as well as the character of the fishing gear, vessels and methods vary from country to country. In spite of this, and because of increasing international economic, commercial and industrial integration, exchange of information and of experience/expertise among the GFCM member countries could bring about technical and institutional developments where increased fishing and organizational efficiency could improve a fishery's commercial feasibility. In parallel, however, one should bear in mind the other management steps that may have to be taken in order to prevent over-fishing.

95. One field for improvement is the ratio between fuel consumption and catch value. This can be tackled through, e.g.:

(a) increased use of passive gear at the expense of the active fishing methods;

(b) improving the efficiency of propulsion systems with the view of obtaining fuel economy rather than increasing the fishing effort;

(c) use of sail for auxiliary propulsion;

(d) better organization of fishing operations;

(e) increased use of fuel-efficiency demersal fishing methods, such as pair trawling and Danish seining.

96. Another field needing improvement is the living and working conditions onboard fishing vessels. In many countries the size of the vessels allows such improvements, but for reasons of tradition or lack of socio-economic incentive to adopt modern design, accomodation onboard remains inferior to other European fisheries. Improved conditions would attract young, educated manpower to fisheries and thus enhance its development.

97. In order to obtain a fruitful exchange of information and cross fertilization among GFCM member countries, it is essential that each country develop its own fishing technology capacity. National fishing technology units, institutes or departments would also serve as a link through which improvements could be channelled to fishermen with the help of fishery extension services. More experienced, well-established fishing technology units or departments can help those that, so far, lack in capacity, by training staff, offering fellowships and through adopting schemes whereby experienced fishing institutes provide permanent advice to newly established units.

98. During the discussion that followed various delegations presented their point of view.

- The socio-economic background and ramifications of the technological changes in a fishery were stressed by most speakers. It was said that fishermen's main objective is maximalization of income. Hence, in some cases like for example in Italy and Spain, they would turn to catching less abundant but high-priced species for the more affluent consumers, rather than concentrate on the bulk fishing for protein production. This will in turn affect their choice of technology.

- Change of technology should follow the Government's policy objectives. Thus, e.g., in Morocco, where the provision of employment is the Government's policy, replacement of purse seining by pelagic trawling, as it took place in Italy, would be counter-productive, for the latter method uses more expensive vessels, more fuel and less labour.

- Successful introduction of a new fishing method such as, say pelagic trawling, required its full integration in other processes of the industry (handling, landing, processing, storing, transporting, marketing). In some cases, this may require new investements and structural changes in the infrastructure and post-harvest services.

- Although some small pelagic species seem to be still under-exploited in certain areas, the very low price they fetch may prevent the development of fishery through the use of appropriate technology except where governments are prepared to extend financial support.

- Fishing gear and vessels may be designed to reduce to the minimum the amount of fuel which has to be spent on their operation. This is done, e.g., in Bulgaria with respect to midwater trawls.

- Socio-cultural aspects can influence the selection of a fishing method, like in the case where the Italian fishermen changed from purse seining to two-boat pelagic trawling, partly at least, for the advantage of having more convenient working hours.

- Similarly, in Israel, although the commercial technological feasibility of off-season trawling has been clearly demonstrated to the sardine purse-seine fishermen, they would not adapt well to the different modes of operation and, thus forfeited that opportunity to increase their income. The same fishermen, however, found other ways of fishing off-season, more suitable to their mentality, by branching off into gillnetting and longlining.

- The delegation of Morocco in particular emphasized the need for improvements in the organization and operation in fishermen's cooperatives. New equipment is being introduced to these cooperatives which are supposed to serve as important development vehicles.

- Most delegates expressed the opinion that successful introduction of new technology depends on the environemental conditions and the sorts and amounts of fish available. Successful Spanish deep-sea pot-fishing trials resulted in only modest commercial implementation, because the species of shrimp harvested (Plesionika sp.) are of a relatively low market value.

- Deep fishing grounds may prevent the use of low-powered pair trawlers. The low density of pelagic fish may prevent efficient use of mid-water trawls.

- In the Gulf of Lions a specification of fishing vessels (trawlers, sardine or tuna boats) followed a period of polyvalency of vessel equipment and utilization (trawler/seiners). However the success of trawls with large mesh and high vertical opening resulted in some kind of polyvalency of trawler catches, with a significant increase of pelagic fish. This evolution has some biological and socio-economic effects and demonstrates the great importance of gear technology in fisheries management.

- The special fishing conditions in the Gulf of Lions made the multi-purpose vessels employed a successful way of exploiting the resources available.

- Fishermen in Italy select for their cod ends a mesh size which makes it possible to retain the small pelagic species while avoiding their netting; this brings the mesh size down to 20 mm. The French experience, however, seems to indicate that small pelagic fish can be successfully caught in 40 mm stretched mesh codends.

- Before inciting fishermen to new fishing methods, it is advisable to consider their impact on the resource management. The enforcement of management rules with some methods may be more difficult than with others. Nonetheless, fishing technology should be regarded not only as a means of improving the capture techniques, but also as one facet of the fishery management through which some of the management objectives may be achieved.

- Fishing technology should not be separated from fisheries extension. It is through the extension service that the technologists can implement in the commercial practice the fruits of their professional achievements. Fishing technology units and services can be of benefit to fishermen also by transferring knowhow and experience from the more to the less successful ones within the same fishery, as it is being done in Israel, an extension service performed at very little budgetary cost.

- In Italy work is being done on the design of a new fishing vessel in which conditions on board will be particularly considered and a propeller nozzle fitted. In Israel, almost all trawlers are fitted with propeller nozzles and since the fishermen did not increase the size of their gear and only slightly their fishing speed, they save up to 30 per cent of fuel, the nozzles cost being recovered within two years.

- A new fishing technology and gear unit has been set up in Morocco within the ISPM. The first achievement was a catalogue of fishing gear used in the country and plans of fishing grounds. The unit also tested pelagic and high-opening trawls in the Mediterranean but did not recommend their introduction to replace purse-seiners.

99. The Council felt it advisable, subject to the availability of funds, to establish a Working Party on Fishing Technology and its Socio-Economic Aspects to allow the Member States to exchange experience and make progress in the fishing technology and other aspects of the capture element of the fisheries. The terms of reference of this working party would be the following:

(i) To serve as an instrument for the exchange of information, experience and expertise with regard to the socio-economic aspects influencing the use of vessels, gear and fishing methods.

(ii) To discuss and help to execute mutual assistance schemes through which GFCM member countries can assist each other in the technological and institutional improvement of their fisheries.

(iii) To discuss and recommend to the GFCM Secretariat the preparation and publication of vessels and equipment catalogues, manuals, and the implementation of other aids pertaining to Mediterranean and Black Sea fishermen and their organizations and institutions (e.g. cooperatives, unions and associations, credit schemes, etc.) and fishing technology.

The Working Party should convene periodically as proposed by the Council, preferably in a major fishing centre of one of its Member States.

B. Utilization and marketing of small pelagic species

100. The subject was introduced by Mr. V. Perović who highlighted the results of the Technical Consultation on the Utilization of Small Pelagic Species in the Mediterranean Area held in Madrid, in May 1981, and the progress made since (see documents GFCM/XV/82/11 and 12). The introduction included main subjects of discussion during the Technical Consultation, such as handling on board fishing vessels, processing, market development and better utilization of small pelagic species as well as a report on activities between the Technical Consultation and the present session, especially in relation to the institutes from member countries and Portugal working on a regional cooperative programme of research for better utilization of small pelagic species.

101. Participants from France, Italy, Morocco, Portugal and Spain gave a brief report on their activities regarding the regional programme of research as mentioned in page 10 of the report of the Consultation.

102. Mr. H. Durand from France discussed the results of research work on problems of utilization with regard to sardine, anchovy, mackerel and horse mackerel. Work was done in the fields of chilling, freezing and thawing, production of smoked and cooked products as well as on a mechanisms of anchovy ripening.

103. Investigations on the quality of sardines in CSW were carried out on board commercial fishing vessels. They compared handling of fish in ice with the CSW method. General conclusion is that the CSW method gave slightly better results when compared to the classical method of icing fish. The main advantage of CSW is in the possibility to bring the temperature of fish down to 0° C in a very short period as well as in easier and faster handling of fish.

104. The influence of variations in temperature during storage of frozen sardine in blocks of 20 kg originally frozen at -40° C and stored at -30° C were investigated. Chemical and above all organoleptic analyses showed differences in quality between fish stored at -30° C and that stored with temperature fluctuations.

105. The influence of thawing on the quality of fish after thawing was also investigated by comparing different thawing methods. Fast thawing methods gave a margin of security of several hours in the quality of fish to be subsequently processed.

106. A few new products were developed based on sardine of a size not suitable for traditional canning purposes. Large sardines were processed using different curing methods such as smoking and marinating. Different factors were investigated such as type of cooking (frying, cooking in hot air), length of cooking, hot or cool packing and storing temperatures. Industry also showed interest in this fish and a few new articles (frozen whole fish or fillets) are present on the French market.

107. Bacteriological and enzymic influences on salted anchovies are being investigated.

108. Utilization of mackerel was also a subject of investigation, especially handling, freezing, storing and thawing (the results are similar to those for sardine). Cold smoking for horse mackerel as well as canning in tomato sauce and in sauce made with vinegar or wine are investigated.

109. The work on minced fish product is based mostly on lean fish as the raw material. Fish with dark meat such as horse mackerel are used to make comparisons. The minced products from horse mackerel were of better quality than those from lean fish. The addition of "sorbitol" and "pyruvate" as well as a combination of the two plus EDTA gave a better texture to the product when it is not previously washed.

110. Ms. M.L. Nunes reported on the research work done in Portugal in the field of utilizing two types of small pelagic species for producing minced fish flesh, fish silage of under utilized species and handling of fish in CSW.

Snipe fish (Macrorhamphosus gracilis and M. scolopax) and Capros aper were used for minced meat production. The fish were frozen before production and the meat separated after thawing by meat-bone separator Baader 694. The yield was 10.2 to 31.9 for snipe fish and 10.7 to 33.3 for Capros aper depending on the size of the mesh perforation of rotating drums. The product was of reasonable quality and might be used to replace some traditional products such as salted cod.

Fish silage of snipe fish and blue whiting was made with formic acid in a concentration of 3 per cent by weight, kept well over a storage period of more than one year.

111. Mr. G. Baldrati (Italy) reported on research being done on the problem of fat oxidation in frozen sardines during storage.

112. Mr. A. Monzini informed the Session about the continuation in his Institute in Parma of the work in developing minced products based on sardine and pollack as the raw material.

113. Mr. A. Chaali discussed the research work in ISPM Casablanca on handling sardine in CSW.

114. Mr. A.J. Borderías reported on the results of research work carried out in Spain on CSW method for handling fish and the construction of containers of a 500 kg capacity designed for using on standard pallets of 1 x 1.2 m. He also reported on the experiments for using whole sardines (with heads and viscera) for producing minced fish products.

Minced meat was made from sardines and Baader 694 was used as a meat bone separator with 3 mm perforated rotating drum. The study included sardines with and without heads and viscera. The experiment included different treatments for fish before processing as well as addition of glucose, sodium glutamate, NaTPP and a mixture of BHA and BHT.

The general conclusion from this study is that there is no great difference in the quality of minced meat during the period of conservation at -20° C, especially if it is

treated with antioxidants. Only the texture of the minced product made from sardines without heads and viscera was more firm and colour of products originating from sardines with heads and viscera was darker.

Minced products made from sardines with heads and viscera and stored at -20° C could be kept using antioxidants and vacuum packed for one year. Work is in progress on improving colour of minced products.

115. Delegates from Bulgaria and Tunisia indicated that utilization and marketing aspects of small pelagic fish were highly important also in their countries which they said were ready to participate in related cooperative research efforts.

116. The Spanish delegation suggested organizing workshops or courses to deal with the problems of fish utilization. Knowing the importance of minced fish, the organization of a workshop on this subject was specifically proposed.

117. The meeting felt that it would be necessary to develop a strategy for the utilization and marketing of small pelagics and specifically whether they should be processed or marketed fresh.

118. Mr. M. Spagnolo presented his paper "Proposals for the expansion of the market for small pelagic fish in Italy" (GFCM/XVI/82/Inf.5) which provides an example of developing a suitable strategy on a national level. The research results show that it is necessary to create conditions which are apt to ensure elasticity of the market as a whole and to provide adequate profit margins to the operators involved in production and distribution in order to achieve a full utilization of species which are under utilized at present. In Italy, about one third of the total small pelagic fish supplies (300 000 t) is used by the processing industry, 71 000 t constitute raw material for fish meal, 50 000 t are exported and about one quarter (79 000 t) is used directly for human consumption, but there is considerable scope for increased household consumption in Italy considering the quantities now destined for fish meal production and for exports. The transfer of these 120 000 t for use as human food requires an increased absorption capacity by the traditional distribution channels - retail trade, catering and processing industry - as well as activating hitherto unused channels and forms of consumption. A programme to achieve this was outlined comprising the following elements:

- promotion of exports of processed products by public export support organizations, establishment of processor's associations and marketing boards as well as a national fund to support financing of storage holdings;

- creation of a network of restaurants making maximum use of small pelagic species in the menues offered (very encouraging results have been achieved in some cases already);

- offer small pelagic species for household consumption in a form which requires less work in meal preparation;

- inclusion of supermarkets in the marketing of small pelagics in fresh or processed form and possibly as fish dishes ready to eat;

- expansion of the consumption of small pelagics in institutions such as hospitals, schools, colleges, armed forces and factory canteens, etc.

119. The work done in Italy was found to be of great interest to other GFCM member countries. Therefore, work in this area should continue as recommended by the Madrid Consultation.

VI. TECHNICAL ASSISTANCE AND REGIONAL COOPERATION

A. State and desirable orientation of technical assistance

120. Under this agenda item reference was made to working document GFCM/XVI/82/14 entitled "External assistance to Mediterranean fisheries". It was explained that the data collected for the preparation of this document originated from both official and non-official sources. The document did not, therefore, pretend to give accurate information

on specific fisheries development projects whether operational or in the pipeline. The purpose was rather to obtain from the aggregate data available an idea of the total external assistance to the fisheries sector of Mediterranean countries, to evaluate how much of this assistance is given as technical assistance or capital aid and identify, in a rough fashion, the source of this assistance, i.e. EEC, multilateral, OPEC or bilateral. The paper hoped, therefore, to give an idea of the trends and orientations in total external assistance to the fisheries sector and stimulate discussion on the sectors where external assistance should be given priority.

121. Total external assistance to the fisheries sector of Mediterranean countries amounted in 1981 to about US$ 23.5 million. Of this amount US$ 8 million or 34 per cent was destined to technical assistance and US$ 15.5 million or 65 per cent to capital aid. Bilateral assistance, whether technical or capital aid, represented 47 per cent of total aid to the fisheries sector. Multilateral assistance ranked next with about 38 per cent. The balance is from OPEC countries.

122. Assistance to the fisheries sector was stable for the years 1979 and 1980 for a total aid amounting to about US$ 9.5 million. This assistance almost tripled in 1981 thanks to large increases in aid from USA and the Federal Republic of Germany in favour of Egypt and Tunisia respectively.

123. In 1981, the World Bank led in total assistance to Mediterranean countries (approximately 33 per cent of total aid) followed by the Federal Republic of Germany and USA each with 20 per cent.

124. When looking at the distribution of external fisheries aid by type of project, fishing ports and equipment rank first with almost 40 per cent of total aid. Following closely behind is aquaculture with 35 per cent and then with only 12 per cent, marketing and processing activities.

B. State and desirable orientation of regional projects

(a) Development and management of fisheries

125. This item was introduced by Mr. N. Kojima. He referred to the very positive reaction of the Fifteenth Session of GFCM in 1980 to the proposal of launching a regional project for the development and management of fisheries in the Mediterranean (see document GFCM/XVI/82/15). Recommendation GFCM/XV/80/4 of that session, unanimously adopted, expressed the opinion of the Council that this project was indispensable for the GFCM to fulfil its responsibilities.

126. This recommendation had been forwarded to the Member Governments of GFCM, on 30 March 1981, by the Director-General of FAO. They were requested to indicate their interest on the proposed project and the contribution they could provide to it.

127. However, three governments only had replied to this request: Greece and Tunisia which had expressed their interest and would consider at a later stage the way in which they could participate, and Italy which had proposed contribution in kind and cash on the condition that it benefits developing Mediterranean countries.

128. Mr. Kojima pointed out that FAO had approached the United Nations Development Programme (UNDP), which had financed similar projects in other areas of the world, but its response had been negative. In view of the UNDP financial difficulties and priorities a financial assistance could not be expected from this organization.

129. The questions the Council would have to consider were therefore the following:

- do Member States still consider the proposed project as a priority and valid, and

- how could its two-year preparatory phase, estimated to cost US$ 600 000 be financed.

If its funding was to be provided by the Mediterranean countries themselves, an appropriate formula for apportioning the shares could be worked out.

130. The representative of the European Economic Community stated that the Community viewed the project with great interest and would be willing to participate in its financing. However, a decision on this matter was linked to the outcome of discussions in course between EEC and FAO.

131. The delegates from the following countries: Algeria, Bulgaria, Morocco, Tunisia and Yugoslavia also stated their major interest in the project. Morocco, which participates in and benefits from the Eastern Central Atlantic project said that a project for the Mediterranean would have a similar beneficial impact in this area and would help to put the North-South collaboration in the region in concrete form.

132. The delegation of Yugoslavia expressed the opinion that initial funding should be made by the Mediterranean governments themselves. When the project would be working, then bilateral or other contributions could be expected.

133. Several delegations, while supporting the project, stated that the draft project document prepared for the Fifteenth Session of the Council was ambitious and too general as regards the objectives of the project. They declared that the immediate specific actions should be limited to those, selected by the most interested countries, of high priority. This revision might result in a better understanding by the countries of the exact role of the project and a possible decrease of its cost and, as a consequence, in more willingness from the countries to participate in its funding.

134. The delegations further suggested that a mission should be organized by FAO for this purpose. It would visit Mediterranean countries, discuss the scope of the project and its revised document with the relevant authorities and seek their views on the funding of the project.

135. It was also pointed out, in this connection, that there was no need to have all of the Mediterranean countries involved to start this project. It could, at the beginning, be limited to a few countries seriously interested in it and be extended, at later stages, to other States.

136. In conclusion of the discussions, the Council decided that all efforts should be made to keep the idea of the project alive and in particular FAO should consider sending the above mentioned mission. In case positive results were obtained, FAO should then rapidly take the necessary steps for the implementation of the project.

(b) Aquaculture

137. Mr. P. Ferlin, the Coordinator of the Regional Mediterranean Aquaculture Development Project (MEDRAP), presented the document GFCM/XVI/82/16 and described some of the field activities and the early training and informational activities. Concerning funding, it was indicated that discussions are still underway with UNDP for the main phase, as far as the full contribution is concerned. Discussions are also underway with other donor countries, and a major initial contribution from Italy may be expected.

138. The Chairman of GFCM emphasized that all the countries were extremely interested in this project and expressed satisfaction on behalf of the Council that it had gotten off to a good start.

139. The delegate from Bulgaria regretted that, in spite of its wish to participate in MEDRAP, his country did not appear as a participating country. The Secretariat explained that this had partly to do with the fact that a project initially planned for the Black Sea had not been approved by UNDP and partly because the UNDP Unit for Europe could not provide financial support in early 1982. With renewed UNDP support, Bulgaria could be included, on condition that she, like the other participating countries, make an official request to the UNDP Office in Geneva regarding participation.

140. The delegate of France asked whether the economic objectives of the project had been considered in the socio-economic framework in which it is developed. The Secretariat explained that this was actually a priority of the project, and this was seconded by the Moroccan and Tunisian delegations.

141. The Chairman asked about relations between the Cooperative Programme of Research on Aquaculture (COPRAQ) and the MEDRAP Project since 1980. The Secretariat emphasized that COPRAQ had not been active during the intersession, for lack of invitation by one of the member countries. This situation will improve as MEDRAP enters its main phase, allowing a more active collaboration. COPRAQ, as an advisory body to MEDRAP on the on hand, and as part of the project to coordinate research bearing directly on development on the other, could meet in 1983.

142. Finally the Council recommended:

- that FAO urge UNDP to approve funding for the main phase of the project so that it can be implemented as soon as possible;

- that FAO continue to explore actively additional means of financing overall operations;

The Council further hoped:

- that the countries of the region, particularly those North of the Mediterranean, would lend financial and technical support to the project;

- that the countries of the Black Sea who wish to do so would joint the project;

- that the MEDRAP project would be able to promote COPRAQ activities.

VII. OTHER MATTERS

A. The FAO World Conference on Fisheries Management and Development

143. The item was introduced by Mr. J.J. Kambona on the basis of document GFCM/XVI/82/18 which described the objectives, scope and format of the proposed FAO World Conference on Fisheries Management and Development and reviewed the preparations already made or proposed.

144. The Council expressed strong support for the convening by the Director-General of the Conference. In this respect it felt that countries from the Mediterranean region could make valuable contributions to the achievement of these objectives, through participation in preparatory meetings or submission of experience papers.

145. Noting possible valuable contributions from concerned international organizations, the Council recommended early consultations with them and hoped that participation at the Conference would be as wide as possible to ensure that all available experience in fisheries management and development is utilized at the Conference.

146. The Council noted also that the subject of the Conference will be discussed at the Twelfth FAO Regional Conference for Africa, 22 September to 2 October 1982 in Algiers, at the Thirteenth Regional Conference for Europe, 4 to 8 October 1982 in Sofia, and at the Sixteenth Regional Conference for the Near East, 25 to 29 October 1982 in Nicosia, and that Member States would then have an opportunity of providing further advice, suggestions and guidance on the matter.

147. The Council shared the view of the Director-General that the Conference should lead not only to the definitions of fishery strategies but should strive to achieve practical and concrete outcomes.

B. Programme of meetings recommended for the next interssession

148. The Council reviewed all the proposed meetings suggested either during the Fifteenth Session, or at the technical consultations held during the intersession (endorsed by the Council at the present session) or during the present session.

149. On condition that the necessary funds for holding these meetings are available and the Secretariat can supply the necessary technical support, the Council recommended holding the following meetings, not necessarily in order of priority:

- Technical Consultation on Acoustic Methods for Fish Detection and Abundance Estimation, Palma de Mallorca, Spain, 8-12 November 1982.

- Technical Consultation on Stock Assessment in the Adriatic, Third Session, Fano, Italy, May or June 1983.

- Technical Consultation on Stock Assessment in the Central Mediterranean, Second Session, Mazara del Vallo, Italy, April 1984.

- Technical Consultation on Stock Assessment in the Eastern Mediterranean.

- Technical Consultation on Stock Assessment in the Black Sea, Second Session.

- Technical Consultation on Stock Assessment in the Western Mediterranean, Third Session, Sète, France, December 1983 (see paragraph 157).

- Cooperative Programme of Research on Aquaculture, Fifth Session.

- Technical Consultation on Methodologies used for Fish Age-Reading, Second Session, 1983.

- Technical Consultation on Methodologies of Size Structure Analysis.

- Working Party on Fishing Technology and its Socio-Economic Aspects.

- Technical Consultation on Red Coral Resources and Their Rational Exploitation, 1983. The principle behind this meeting was discussed in paragraph 93. Considering the budgetary limitations of FAO, the Spanish delegation agreed to consider the possibility of holding the meeting in Spain and being responsible for organizing it. A definitive answer would be sent to the Secretariat as soon as possible.

- Technical Consultation on the Utilization of Small Pelagic Species in the Mediterranean Area, Second Session.
  It was also recommended that a training course be held on methods of utilization of these species.

- Working Party on Resource Appraisal and Fishery Statistics, Eighth Session, 1984.

- Committee on Resource Management, Fifth Session, 1984.

These last two meetings should be held immediately one after the other.

150. The Council also wished to underline the importance it attached to the question of the management and rational exploitation of stocks exploited in common by several countries. It recommended that this subject appear regularly on the agendas of sub-regional technical consultations on stock assessment. It also recommended that the theoretical and practical problems arising in connection with these stocks be considered during an ad hoc session to be organized as part of the Fifth Session of the Committee on Resource Management.

C. Sub-regional cooperation

151. The Moroccan and Spanish delegations stated that their respective laboratories had undertaken independently an acoustic prospection survey of the pelagic resources of the Alboran Sea.

152. They agreed on the necessity to develop as soon as possible a close collaboration between all the countries of the sub-region in order to undertake henceforth these assessments simultaneously.

D. Selected bibliography on Mediterranean fisheries (January 1978 - February 1982)

153. The Secretariat presented the document GFCM/XVI/82/Inf.3 which was prepared in the light of the fact that there seems to be a very great number of documents emerging from various institutions in the Mediterranean basin which deal wholely, partially or superficially with scientific or technical aspects of fisheries and related sciences which

often have limited distribution and do not always reach those who might be interested in them.

154. The Council felt that this bibliography was of real utility and hoped that it would be updated and published in time for its future sessions.

E. Relations with IOC

155. The representative of the Intergovernmental Oceanographic Commission (IOC) drew the Council's attention to the Commission's resolution to draw up a major programme of oceanographic studies dealing specifically with marine ecology as related to fish populations. This programme, a joint preparation of the FAO Advisory Committee on Marine Resources Research (ACMRR) and the Scientific Committee on Oceanic Research (SCOR), proposes to focus on the correlation between environmental variability and fluctuations of living resources.

156. The Council considered that this interesting initiative should be encouraged. It hoped the programme would develop on the basis of very close regional collaboration between IOC and GFCM, taking into account the special features of each region.

F. Third Technical Consultation on Stock Assessment in the Balearic and Gulf of Lions Statistical Divisions

157. The French delegation referred to paragraph 116 of the report of the second consultation in which the French representation had expressed the wish to host the third consultation at the ISTPM Centre in Sète at the end of 1983, subject to the approval of its Government; the delegation confirmed its Government's invitation in accordance with procedures to be finalized with FAO.

VIII. PRESENTATION AND DISCUSSION OF TECHNICAL PAPERS

158. The following communications were presented by their authors to the Council which heard and commented them with great interest:

- Proyecto de Estudio de la Pesquería Litoral de Mallorca, U. Labarta, M. Llabrés, P. Oliver
- Investigaciones de Prospección Pesqueras Llevadas a cabo en el Instituto de Investigaciones Pesqueras de Barcelona, C. Bas
- Studies on the Upgrading of Small Pelagic Species of the Portuguese Coast, I. Batista, M.L. Nunes
- Tratemiento y Conservación de Pasta de Sardina, M. Tejada, A. Moral, A.J. Borderías
- Fish Silages from Underutilized Species, I. Batista
- Minced Fish Flesh from two Small Pelagic Species, M.L. Nunes.

Summaries of these communications are given in Appendix E.

159. After these communications, interesting diapositives on artificial reefs of the Monaco sub-marine preserve, an experiment on mussel breeding in suspension on ropes at cape of Adge (France) and artificial reefs in Ancona, Fregene and Portonovo (Italy) were shown.

IX. ELECTION OF CHAIRMAN AND VICE-CHAIRMEN

160. A Nomination Committee met on Wednesday, 29 September. Its spokesman, the Spanish representative, proposed to the Council the following members of the Bureau, whom the Council approved:

Chairman:	Mr. M. Hadj Ali Salem (Tunisia)
First Vice-Chairman:	Mr. A. Bordes (France)
Second Vice-Chairman:	Mr. I.L. Yanev (Bulgaria)

161. On behalf of the Council, the Spanish representative thanked Mr. G. Bombace for the way in which he had chaired this session and for the efficiency with which he had fulfilled his duty as Chairman.

X. DATE AND PLACE OF THE SEVENTEENTH SESSION

162. In accordance with Rule II-1 of the Rules of Procedure of the GFCM, the Council, in consultation with the Director-General of FAO, decides the time and place for the next session, in accordance with the requirements of the Council's programmes and the terms of the invitation of the country in which the session is to be held.

163. The Council noted the suggestion of the Chairman that the seventeenth session of the GFCM should be held at FAO Headquarters, in Rome, in two years time and it was agreed, with the approval of the Chairman, to let the Director-General of FAO decide on the exact date of the session.

XI. ADOPTION OF THE REPORT

164. The Report of the Sixteenth Session of GFCM was adopted on 1 October 1982.

APPENDIX A

Agenda

1. Opening of the session

2. Adoption of the agenda and arrangements for the session

3. Monitoring and assessment of resources

   3.1 Fishery statistics

   3.2 Assessment of resources

      (a) Assessment of coastal resources
      (b) Results of sub-regional technical consultations and recommendations on future activities

4. Improvement of natural productivity

   4.1 Progress in the establishment of artificial reefs

   4.2 Aquaculture

5. Fisheries management

   5.1 Limitation of mesh size

   5.2 Regulation of fishing effort

   5.3 Management of coastal fisheries and other methods of exploiting coastal living resources

6. Fisheries development and increase of the value of catches

   6.1 Fisheries technology

   6.2 Utilization and marketing of small pelagic species

7. Technical assistance and regional cooperation

   7.1 State and desirable orientation of technical assistance

   7.2 State and desirable orientation of regional projects

      (a) Development and management of fisheries
      (b) Aquaculture

8. Other matters

9. Presentation and discussion of technical papers

10. Election of the Chairman and Vice-Chairmen

11. Date and place of the Seventeenth Session

12. Adoption of the report

ANNEXE B/APPENDIX B

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APPENDIX C

List of documents presented at the session

A. Documents presented by the Secretariat

GFCM/XVI/82/1	Provisional annotated agenda and timetable
GFCM/XVI/82/2	Progress report on the GFCM statistical system
GFCM/XVI/82/3	GFCM Statistical Bulletin No. 4: nominal catches 1970-80
GFCM/XVI/82/4	Report of the Second Technical Consultation on Stock Assessment in the Adriatic
GFCM/XVI/82/5	Report of the Second Technical Consultation on Stock Assessment in the Balearic and Gulf of Lions Statistical Divisions
GFCM/XVI/82/6	Report of the Technical Consultation on Stock Assessment in the Central Mediterranean
GFCM/XVI/82/7	Report of the Technical Consultation on Methodologies used for Fish Age-Reading
GFCM/XVI/82/8	Summary report on future action in the field of resource assessment
GFCM/XVI/82/9	Report of the Fourth Session of the Committee on Resource Management
GFCM/XVI/82/10	Report of the Technical Consultation on Regulation of Effort in Mediterranean Trawl Fisheries
GFCM/XVI/82/11	Report of the Technical Consultation on the Utilization of Small Pelagic Species in the Mediterranean Area
GFCM/XVI/82/12	Progress report on the cooperative programme on small pelagic species utilization and marketing
GFCM/XVI/82/13	Progress report on management of coastal lagoon fisheries
GFCM/XVI/82/14	External assistance to Mediterranean fisheries
GFCM/XVI/82/15	Progress report on the proposal for a regional project for the development and management of fisheries in the Mediterranean
GFCM/XVI/82/16	Progress report on the Mediterranean Regional Aquaculture Project (MEDRAP)
GFCM/XVI/82/18	The FAO World Conference on Fisheries Management and Development
GFCM/XVI/82/Inf.1	Provisional list of documents
GFCM/XVI/82/Inf.2	Provisional list of participants
GFCM/XVI/82/Inf.3	Selected bibliography on Mediterranean fisheries (January 1978 - February 1982)
GFCM/XVI/82/Inf.4	Costs and earnings in the Italian fishery for small pelagic species, prepared by M. Spagnolo
GFCM/XVI/82/Inf.5	Proposals for the expansion of the market for small pelagic fish in Italy, prepared by M. Spagnolo

B. Documents presented to the Council by participants

Batista, I., Fish silages of underutilized species

Batista, I. et M.L. Nunes, Studies on the upgrading of small pelagic species of Portuguese coast

Durand, H., Etudes menées à l'Institut scientifique et technique des pêches maritimes (ISTPM) sur l'utilisation des petits pélagiques

Labarta, U., M. Llabrés et P. Oliver, Proyecto de estudio de la pesquería litoral de Mallorca

Lumare, F., State of Italian aquaculture in the production and research sectors

Nunes, L., Minced fish flesh from two small pelagic species

Tejada, M., A. Moral et A.J. Borderías, Tratamiento y conservación de pasta de sardina

Trotta, P., Present state of Artemia salina occurrence in salterns in Italy, and its use

Documents listed under "B" are not available from the Secretariat.

APPENDIX D

Summary of actions to be undertaken in the future in the field of stock assessment

I. INTRODUCTION

1. Since the Fifteenth Session of the General Fisheries Council, held in Palma de Mallorca from 18 to 26 September 1980, four technical consultations have been organized:

(a) Second Technical Consultation on Stock Assessment in the Adriatic, Ancona, 18-22 May 1981;

(b) Technical Consultation on Methodologies used in Fish Age-Reading. Montpellier, 5-9 October 1981;

(c) Second Technical Consultation on Stock Assessment in the Balearic and Gulf of Lions Statistical Divisions. Casablanca, 7-11 December 1981, and

(d) Technical Consultation on Stock Assessment in the Central Mediterranean. Tunis, 19-23 April 1982.

2. The detailed reports of these meetings constitute documents GFCM/XVI/82/4-7 which include, at the head of each report, a list summarizing the decisions, guidelines and recommendations of the Technical Consultation.

3. The present document will therefore review only the main actions recommended, in order to draw the attention of the Council to the major problems.

II. SECOND TECHNICAL CONSULTATION ON STOCK ASSESSMENT IN THE ADRIATIC

4. The progress of the coordinated fishery research programme was uneven, depending on the actions concerned. In the future the research effort should centre mainly on improvement of base data concerning the environment, exploited species and fishery. The studies specifically recommended concern, among others:

- synoptic maps: populations and hydrological conditions;
- hydrological data time series;
- synopsis of main biological parameters (growth, mortality, reproduction, etc.);
- improvement of catch and effort statistics, and
- collection of biological data at landing.

5. The gap in regard to the last two aspects is particularly noticeable. Because of this the Consultation recommended that the use of direct assessment methods (acoustical and by trawling) be continued and even strengthened.

6. In regard to acoustical survey cruises, no notable progress was observed because various administrative problems prevented adequate scientific collaboration at the regional level without which progress will always be scarce.

7. Trawling and the study of egg-and-larva-abundance cruises were continued. In the first of these the sampling plan should be intensified and rationalized.

8. In general the Council might wish to examine the results obtained and the blocks which still hold back the development of effective regional collaboration. In that case, it could refer to paragraph 40 of the report of this Technical Consultation which points

out that: the pace of the data collection process and especially of the analysis and transition of data... and subregional concerted management mechanisms operate on a year-to-year basis (a time period which is necessary, considering the short life-span of Adriatic exploited species).

9. In fact, the Council could seek to determine whether the human and material resources available at present and their coordination in the Adriatic region are adequate for the targets established in the resource evaluation and management sector.

III. TECHNICAL CONSULTATION ON METHODOLOGIES USED IN FISH AGE-READING

10. At this meeting, in which researchers from the CECAF region also participated, a number of recommendations were made concerning the adoption of standard methodologies.

IV. SECOND TECHNICAL CONSULTATION ON STOCK ASSESSMENT IN THE WESTERN MEDITERRANEAN

11. The participants repeated the recommendations of the preceding consultation which are still valid. The recommendations made at the Second Session concern:

- improvement of statistics: catch data by species, followed by species composition of demersal and pelagic catches, distinction of catches made in Spanish and Moroccan waters in the Sea of Alboran, more accurate evaluation of the area of exploited fishing grounds;

- use of methods of establishment of dynamic parameters through analysis of size structures;

- promotion of regional development of research on age (through otolith analysis) and stock identity (through electrophoresis), and

- promotion of joint trawling and acoustic survey cruises.

12. The Council could examine these results and, in particular, discuss possibilities of intensifying collaboration between the laboratories of the region through organization of joint survey cruises and of a technical consultation on size structure analysis methods to determine dynamic parameters.

V. TECHNICAL CONSULTATION ON STOCK ASSESSMENT IN THE CENTRAL MEDITERRANEAN

13. This first meeting was mainly an opportunity to make inventory of data available and problems to be solved. It permitted the detection of a grave inadequacy in the knowledge of dynamic parameters (mortality, recruitment, selectivity, etc.).

14. Among the actions particularly recommended for the future, the Council might consider the following:

- collection of biological and fishery data should be improved, particularly in Sicily where an effort is now underway. A pragmatic evaluation approach should be adopted to compensate for the lack of data;

- the interactions between coastal and industrial fishery should be analysed. Socio-economic studies should be undertaken for this purpose, and

- the emerging sub-regional collaboration should be strengthened. Such strengthening depends on two types of action: on one hand, positive participation in meetings of all the countries of the sub-region and, on the other hand, the development of joint survey cruises (acoustical and by trawling).

VI. CONCLUSIONS

15. In reading these few notes it will be observed that the research effort in the near future should centre on improvement of the collection of base data, such as catches, effort, size and age, etc., - a traditional recommendation for the Mediterranean - and their regular compilation.

16. This effort, aimed at a traditional utilization of evaluation techniques, should be supported by the organization of joint resource assessment cruises undertaken at regular intervals to allow continuous monitoring of the state of those resources. Such cruises are now underway or in preparation in all the geographic sectors covered by the technical consultations and the Council may consider it useful to ask the countries concerned for information on their preparation or execution.

17. Studies on interactions between exploitation sectors and socio-economic studies are also recommended.

18. Lastly, it is advisable that in the light of the results obtained during the past three years by technical consultations, the Council consider the updating of human and material resources available in the Mediterranean and of their structure and distribution in relation to rational resource management objectives, especially in the areas where the resources are shared or exploited jointly (in particular, the Adriatic, Sea of Alboran, Central Mediterranean).

19. Within this order of ideas the Council may wish to propose concrete actions intended to promote the execution of the Regional Project for Fishery Development and Management in the Mediterranean whose implementation was unanimously recommended by the Fifteenth Session of GFCM to partially compensate for the gaps in this field characteristic of the Mediterranean (see also Item 7.2 of the provisional agenda).

VII. ACTION SUGGESTED TO THE COUNCIL

20. The Council is asked to approve the reports of the four technical consultations and, in particular, to express its opinion concerning the recommendation, approved by each of them to organize another meeting in two years.

APPENDIX E

Summaries of technical communications (see paragraph 158 of the Report)

A. PROYECTO DE ESTUDIO DE LA PESQUERIA LITORAL DE MALLORCA
U. Labarta, M. Llabrés y P. Oliver

Las especiales condiciones que dominan la actividad pesquera de la flota de artes menores en Mallorca, de las cuales destacaríamos la estacionalidad, junto con la consideración de que la rentabilidad de la explotación es normalmente muy alta, hacen que los métodos habitualmente utilizados para la ordenación sean inaplicables en este caso.

Con vistas a la ordenación de esta pesquería, el objetivo más inmediato es el establecimiento de un diagrama de flujo bioeconómico, que contemple todos los aspectos de la actividad pesquera, con especial atención al factor socio-económico. Y no sólo cualitativo, sino que, mediante un sistema estadístico eficaz, se completará el diagrama cuantificando los flujos.

Por ello se ha establecido, en una fase previa, una encuesta marco mediante la cual las distintas unidades de pesca se clasifican según zonas geográficas, arte empleado, categorías de embarcaciones y especies objetivo, disponiéndose en la actualidad de un censo casi completo. Como breve descripción de la pesquería se cita:

Artes más utilizados:

- redes de enmalle de deriva (solta, sardinal, almadrabilla, bonitolera)
- tresmallo y tresmallo langostero
- nasas
- anzuelo (curricán, palangre, volantín y potera)
- arrastre (jábeja, volador, vaqueta, artet, boliche y gánguil).

Especies (en orden de prelación):

- langosta (Palinurus vulgaris) y cap roij (Scorpaena scrofa)
- rata (Uranoscopus scaber), escórpora (Scorpaena porcus), araña (Trachinus araneus), sepia (Sepia officinalis) y salmonete (Mullus surmuletus)
- jonquillo (Aphya minuta)
- calamar (Loligo vulgaris)
- llampuga (Coryphaena hippurus).

La fuente de información para la recogida de datos comprende:

- información oral, mediante entrevistas
- información directa, con salidas al mar y consultas con el sector
- información de contraste, a partir de los datos de cofradías, lonja, mayoristas, etc.

El estudio biológico de las especies se realizará a partir de muestras procedentes de la flota de arrastre. Asimismo, se iniciarán estudios de la selectividad de los artes. El desarrollo progresivo del proyecto conducirá al establecimiento de unas medidas precautorias a corto plazo basadas en hipótesis que, en un proceso continuo de retroalimentación, se irán modificando hasta converger en una estabilidad de la actividad pesquera en su estado más rentable.

B. INVESTIGACIONES DE PROSPECCIÓN PESQUERAS LLEVADAS A CABO EN EL INSTITUTO DE INVESTIGACIONES PESQUERAS DE BARCELONA
C. Bas

La enorme degradación de la biocenosis de las costas catalanas ha estimulado el estudio de la degradación de comunidades multispecíficas por efecto de la pesca excesiva. El proyecto comprende dos partes: a) recogida de información de capturas, esfuerzos y parametros biológicos fundamentales y b) preparación del modelo matemático más util para expresar la degradación de la comunidad.

Para la recogida de estadisticas de captura y esfuerzo se utilizan, por una parte los datos oficiales y por otra la información detallada procedente de personal contratado en los principales lugares de pesca.

La información biológica se obtiene de acuerdo con la siguiente estrategia: trimestralmente se contratan embarcaciones en cada uno de los principales puertos, que durante dos diaz verifican pescas en las principales zonas. Estas capturas son trasladadas al Instituto de Barcelona para la examen con especial atención a los siguientes parámetros: longitud, peso, edad, sexualidad y relaciones troficas.

Por otra parte un equipo especial trabaja con los datos que se van recogiendo en la confección del modelo.

Con otro objetivo se estan desarrollando investigaciones para un mejor conocimiento y evaluación de las poblaciones batipelágicas entre Cataluña y Baleares.

C. STUDIES ON THE UPGRADING OF SMALL PELAGIC SPECIES OF THE PORTUGUESE COAST
I. Batista and Maria Leonor Nunes

The biology, stock assessment and utilization of small pelagic species are some of the programmes now developed in the Instituto Nacional de Investigaçao das Pescas (INIP). The main species in study are: snipe fish (Macrorhamphosus spp.), "mini-saia" (Capros aper), "pilado" (Polybius henslowi)) and sardine (Sardina pilchardus).

Snipe fish and "mini-saia" are species relatively recent in the Portuguese fishery. The catching of snipe fish, for example, began in the sixties. They have been used till now for reduction to fish meal and oil on account of their size and shape which make them not suitable for direct consumption.

"Pilado" is a small pelagic crab, very abundant in some regions, which is caught by trawlers and purse seiners and is generally used as a fertilizer and also, in a small scale, as bait for the line fishery.

In the Fish Technology Department, and according to the preliminar regional programme of research on better utilization of small pelagic species, studies have been developed on chemical composition, preparation of minced fish and fish silage. A few essays have also been developed on the preservation of fish in CSW, on the preparation of protein isolates and of chitin from the shell of "pilado", and on the construction of a prototype for the mechanical heading and gutting of snipe fish.

D. TRATAMIENTO Y CONSERVACIÓN DE PASTA DE SARDINA
M. Tejada, A. Moral y A.J. Borderías

En el presente trabajo se estudia la posibilidad de aprovechamiento de la sardina en forma de pasta y se estudia su conservación al estado congelado.

Para ello, se ha obtenido por extrusión pasta de sardina entera y de sardina descabezada y eviscerada. Algunos lotes se han tratado con aditivos protectores y antioxidantes y otros se han sometido a un tratamiento térmico para reducir la carga microbiana.

Como resumen puede decirse que los hechos más evidentes que se aprecian en este trabajo son que los lotes hechos a partir de sardina entera no presentan unas características durante todo el período de conservación más desfavorables que los de sardina descabezada y eviscerada, sobre todo si se tratan con antioxidantes, pero incluso en los testigos hasta el 8º mes tampoco aparecen diferencias evidentes. Unicamente la textura de los Lotes D es algo más dura que la de los E y el color de estos últimos es excesivamente oscuro.

Respecto al tratamiento térmico efectuado a tres temperaturas distintas, sólo es efectivo el de 70º C. Con el calentamiento, el producto pierde textura haciéndose mas fluido, disminuyendo acusadamente la solubilidad protéica; sin embargo, el hecho de que la capacidad de emulsión, como ya se ha visto, permanezca inalterable, lo haría un producto perfectamente utilizable para la fabricación de embutidos de emulsión.

Aún con todo y teniendo en cuenta el efecto bactericida de la congelación sobre los gérmenes gram (-), que son la mayoría, pensamos que esta acción es suficiente y no se hace necesaria ninguna tecnología adicional como es el calentamiento.

Se puede considerar que la pasta de sardina entera es un producto económico, cuya conservación al estado congelado a -20º C es posible durante casi un año con la sola incorporación de antioxidantes y envasado a vacío. El sabor durante este período es altamente aceptado y después de la congelación no presenta ningún problema sanitario. El único problema es la coloración excesivamente oscura, que se puede modificar por el lavado de la pasta e incorporación posterior de aditivos para ligar el agua residual que queda en las pastas después del escurrido.

Por otra parte, la pasta hecha a partir de sardina eviscerada, aunque algo más cara sigue siendo un producto barato y que necesita sólo la adición de protectores protéicos y antioxidantes para preservar la textura y evitar el enranciamiento durante un año de conservación a -20º C. Este producto contrariamente al anterior, es satisfactorio en todas sus propiedades sensoriales.

E. FISH SILAGES FROM UNDERUTILIZED SPECIES

I. Batista

Blue whiting (Micromesistius poutassou) and snipe fish (Macrorhamphosus spp.) were utilized in the preparation of fish silages. The blue whiting silages were prepared with 85% formic acid and 50% sulphuric and 85% formic acid mixtures. The snipe fish silages were prepared with formic acid only. A powdered carbohydrate was also added to fish silage in the ratio 1:1 to give a dry meal. Silage stability was observed in order to choose the best mixtures. The proximate composition of each silage and the main protein and oil changes occurring during storage were observed.

Silages prepared with formic acid, 3% (W/W), kept well over a storage period of more than one year. Blue whiting fish silages prepared with the mixtures 5:1 and 5:0,75 (sulphuric acid : formic acid) had a good stability.

In all silages there was an important solubilization of protein which increase with the pH. It was also observed a high rancidification of the oil which advises its remotion as soon as possible.

Dried silages prepared with wheat bran could be a good alternative to the liquid product.

F. MINCED FISH FLESH FROM TWO SMALL PELAGIC SPECIES

M.L. Nunes

Using a mechanical deboner, edible flesh was obtained from snipe fish (Macrorhamphosus spp.) and "mini-saia" (Capros aper), headed and gutted.

Yields of production, composition and quality were investigated when different experimental conditions were employed (different drums and pressures).

Yields based upon whole fish and dressed fish are respectively ca 32 and 70% and mechanically recovery of fish flesh increased TBA values and, on the contrary, protein extractability decreased. Drums with 3 mm diameter perforations under maximum pressure offer a suitable compromise in terms of bone content, Hunter L values and appearance.

These minces can be used in fish cakes and fish sticks preparation replacing some of the traditional portuguese seafood products made with salted cod.

If these resources are to be utilized in minced fish production it is necessary to improve its preservation on board and design and construct equipment specifically intended for handling these small species since the conventional equipment is not suitable.

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ISBN 92-5-101313-6